

II. Remarks

The Official Action of December 17, 2010 has been thoroughly studied. Accordingly, the changes presented herein for the application, considered together with the following remarks, are believed to be sufficient to place the application into condition for allowance.

By the present amendment each of claims claim 11 has been corrected to delete the number average molecular weight Mn of 300-1,400 in favor of 400-1,000.

Entry of the change to claim 11 is respectfully requested.

Claims 1-6 and 9-12 are pending in this application.

Claims 1-6 and 9-12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication No. 2002/0068797 to Ikemoto et al. in view of U.S. Patent Application Publication No. 2004/0106723 to Yang et al. and U.S. Patent Application Publication No. 2004/0226393 to Hong.

For the reasons set forth below, it is submitted that each of the pending claims are allowable over the prior art of record and therefore, the outstanding rejection of the claims should properly be withdrawn.

Favorable reconsideration by the Examiner is earnestly solicited.

The Examiner has relied upon Ikemoto et al. as disclosing:

...a rubber composition comprising 1) a rubber compound composed of at least one of an ethylene-propylene-diene (EPDM) terpolymer and an ethylene-propylene (EPM) copolymer, 2) a peroxide vulcanizing agent, 3) a resorcinol-based compound, and 4) a melamine resin (¶0008-0011) (claims 1, 2). Example 1 of Ikemoto discloses a rubber composition comprising 100 parts of ESPRENE 501A, an EPDM rubber having a Mooney viscosity (ML 100°C) of 43 and comprising 50% ethylene, 4% diene, and, by extension, 46% propylene and 4.2 parts di-t-butyl peroxy-diisopropylbenzene as a peroxide vulcanizing agent (¶0038) (claims 1, 2). Example 7 of Ikemoto discloses a rubber composition prepared in a

manner similar to Example 1, except ESPRENE 201, an EPM rubber having a Mooney viscosity (ML 100°C) of 43, was used instead of EPDM. Ikemoto teaches that the rubber compositions of US20020068797 may be used as rubber vibration insulators (§10036).

As stated above, Ikemoto recites that the rubber compound is composed of at least one of EPDM and EPM; Ikemoto therefore teaches the use of a rubber composition comprising a blend of EPDM and EPM. The examiner therefore takes the position that it would have been obvious to one of ordinary skill in the art at the time the invention was made to prepare a blend rubber comprising ESPRENE 501A and ESPRENE 201 to prepare a rubber composition as described in US20020068797 (claim 2).

Hong has been relied upon as disclosing a conventional crankshaft that is equipped with a damper pulley.

The Examiner concedes that:

Ikemoto and Hong are both silent regarding the addition of a C₈-C₁₂ α-olefin oligomer having a number average molecular weight of 300-1400 to EPDM/EPM.

The Examiner has relied upon Yang et al. as disclosing:

...the use of oligomers of C₆ to C₁₄ α-olefins (claims 1, 2) (§10077) having a number average molecular weight in the range of **100-21,000** (claims 1, 2) (§10079) as a non-functional plasticizer (NFP) for polyolefin homopolymers and copolymers (§10002, 0039). Yang discloses that the polyolefin is present in the final composition at levels from 40 to 99.9% by weight, based on the total weight of polyolefin and NFP; by extension, the composition comprises 0.1 to 60% by weight of the NFP (claims 1, 2) (§10043). Yang discloses that the addition of the NFP results in a polymer composition having improved properties (§10007-0008).

The Examiner further states:

Ikemoto teaches that the polymer composition of US2002/0068797 may contain additives (§10033-0034). As taught by Yang, it was known in the art to use low molecular weight oligomers of C₆ to C₁₄ α-olefins as plasticizers for polyolefin copolymer.

The Examiner therefore takes the position that:

...it would be obvious....to modify the damper rendered obvious by the combination of Ikemoto and Hong by adding 1-60% by weight of a C_6 to C_{14} α -olefins having Mn of 100 to 21,000 to the EPDM/EPDM composition, for the purpose of obtaining a damper having improved properties, as taught by Yang.

On page 3 of the Office Action the Examiner has stated that:

Barring a showing of factual evidence demonstrating unexpected results commensurate in scope with the claimed invention, it therefore would have been obvious to one of ordinary skill in the art to use an oligomer having the claimed Mn as a plasticizer in the composition of Ikemoto in view of the teachings of Yang.

Applicants presently claim a Mn of 400-1,000 which is disclosed in applicants' original specification as being a preferred range.

As the Examiner has noted on page 4 of the Office Action, applicant's working examples involve oligomers having a Mn of 690 (Examples 1-3), Mn of 287 (Comparative Example 4), and 2000 (Comparative Example 5).

In order to demonstrate a criticality that demarks applicants' lower limit Mn of 300 and the preferred (and now claimed) lower limit Mn of 400, applicants obtained an α -olefin oligomer having a Mn of 443. Here it is noted that for all practical purposes this commercially available α -olefin oligomer was the closest applicants found available to having a Mn of 400. That is, those skilled in the art understand that it is impractical to produce α -olefin oligomers with precise Mn's such as 400, 410, 420, etc. even though, as in the case of the present invention, predictions and reasonable expectations can be made (based upon experimentation) to establish conservative limitations on Mn ranges that will produce predictable results - as in the conclusion that an α -olefin oligomer having a Mn of 400 or more will produce distinguishing results over an α -olefin oligomer

having a Mn of 300, and will more certainly produce unexpected results over α -olefin oligomer having a Mn of 100, as taught by Yang et al.

Thus, it is submitted that the test results presented herein below establish unexpected results over the prior art relied upon and combined by the Examiner, including Yang et al.

The pending claims recite a lower Mn for the α -olefin oligomer of 400 that, it is submitted, more clearly distinguishes over the average molecular weight of 287 which is presented in applicants' comparative Example 4 as producing poor results, including volatilization at the cross-linking and the physical properties that are not stabilized, and particularly due to volatilization at the heat aging the change in hardness is large.

From these results applicants have determined that α -olefin oligomers having a Mn value of less than 300 undergoes volatilization at the cross-linking or heat aging, resulting in considerable deterioration of physical properties and that α -olefin oligomers having a Mn value of greater than 300 avoid these problems. The point being that there is a criticality associated with a Mn value of 300.

The presently claimed number average molecular weight of 400-1,000 for the α -olefin oligomer with a lower limit of 400 is believed to more clearly distinguish over the prior art and encompass an average molecular weight that provides results that are not found in or otherwise obvious over the prior art (unexpected) and which therefore establish a criticality that patentably distinguishes over the prior art.

Using the α -olefin oligomer having a Mn of 443, Experiment 1 in applicants' specification was conducted and the following results are provided:

Compounding components:

EPDM-1	(parts by weight)	30
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EPDM-2 (parts by weight) 40

EPM (parts by weight) 30

Properties of the blend rubber:

P/E ratio by weight 46.7/53.3

Mooney viscosity (ML100) 50

α -olefin oligomer (parts by weight; Mn: 433) 50

HAF carbon black (parts by weight) 70

Test items and evaluation:

Normal state properties

Hardness (JIS A) 75

Tensile strength (MPa) 20.0

Elongation (%) 265

Heat resistance

Change in hardness (points) +3

Percent change of tensile strength (%) -4

Percent change of elongation (%) -5

Gehman torsional test

T100 -55

Change in resonance frequency

-30°C/60°C (%) 60

Evaluation ○

100°C/60°C (%) -8.4

Evaluation ○

Resonance magnification

Magnification (times)	4.5
Evaluation	<input type="radio"/>
Resonance point durability test	
Evaluation	<input type="radio"/>
Kneadability-Moldability	
Evaluation	<input type="radio"/>
Actual engine test evaluation	
Evaluation	<input type="radio"/>

By comparing the above results to the results set forth in applicants' specification, it can clearly be seen that when the Mn of the α -olefin oligomer is below 300, i.e. 287 the properties and characteristics of the resulting EPDM composition are inferior to the same properties and characteristics of an EPDM composition that is produced from an α -olefin oligomer that has a Mn of greater than 400, i.e. 443.

In actuality, during the course of the present invention, applicants determined and disclose that using an α -olefin oligomer having a Mn of less than 300 results in poor physical properties, and thus a Mn range of 300-1,400 was determined to be suitable for purposes of the present invention and a range of 400-1,000 was determined to be preferred.

The testing presented herein of an α -olefin oligomer having a Mn of 443, represents a practical testing of applicants' invention and is believed to establish a criticality for the use of an α -olefin oligomer having a Mn of 400 or greater (as compared to the lower Mn of 100 taught by Yang et al.). In this regards, applicants claimed lower limit of 400, by practicality covers any α -olefin oligomer that one may attempt to obtain

or produce to practice applicants' claimed invention, such as an α -olefin oligomer having a Mn of 443, which applicants were able to obtain.

On page 3 of the Office Action under the *Response to Arguments* section the Examiner has stated that:

The mere fact that the lower limit of 100 disclosed by Yang is less than the claimed lower limit of 300 does not teach away from the use of the overlapping portion of the prior art range and the claimed range.

Yang et al. teaches a lower limit of 100. Applicants presently claim a lower limit of 400.

It is believed that the testing presented clearly teaches that the lower ranges of Yang et al. and applicants' claimed invention do not overlap without Yang et al.'s lower range adversely effecting applicants' claimed invention. Further is it submitted that those skilled in the art would recognize and accept that applicants' lower range of 400 distinguishes applicants' invention over Yang et al. as combined with Ikemoto et al. and Hong.

Upon the Examiner's request, applicants will submit the testing set forth herein in the form of a Declaration.

Based upon the above distinctions between the prior art relied upon by the Examiner and the present invention, and the overall teachings of prior art, properly considered as a whole, it is respectfully submitted that the Examiner cannot rely upon the prior art as required under 35 U.S.C. §103 to establish a *prima facie* case of obviousness of applicants' claimed invention.

It is, therefore, submitted that any reliance upon prior art would be improper inasmuch as the prior art does not remotely anticipate, teach, suggest or render obvious the present invention.

It is submitted that the claims, as now amended, and the discussion contained herein clearly show that the claimed invention is novel and neither anticipated nor obvious over the teachings of the prior art and the outstanding rejection of the claims should hence be withdrawn.

Therefore, reconsideration and withdrawal of the outstanding rejection of the claims and an early allowance of the claims is believed to be in order.

It is believed that the above represents a complete response to the Official Action and reconsideration is requested.

Conclusion

It is believed that the above represents a complete response to the Official Action and reconsideration is requested.

If upon consideration of the above, the Examiner should feel that there remain outstanding issues in the present application that could be resolved; the Examiner is invited to contact applicants' patent counsel at the telephone number given below to discuss such issues.

To the extent necessary, a petition for an extension of time under 37 CFR §1.136 is hereby made. Please charge the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 23-1925 and please credit any excess fees to such deposit account.

Respectfully submitted,

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